

SOME OBSERVATIONS ON BURROW ARCHITECTURE OF BURROWING SPIDER *Geolycosa* Montgomery, 1904 (ARANEAE, LYCOSIDAE) AT VAIRAT, MELGHAT TIGER RESERVE, MAHARASHTRA, INDIA.

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ABSTRACT

The burrowing habitat play important role in the survival of *Geolycosa* spiders. The field study was conducted to characterize burrowing behavior of the *Geolycosa* sp. The Melghat Tiger Reserve (MTR) is located in the Satpuda hill ranges of Central India's Maharashtra state. The Vairat is the highest point in Melghat tiger reserve (MTR) where patterns of burrowing habit of *Geolycosa* sp. was studied during summer season (May – 2011). 50 burrows of *Geolycosa* sp. and diameters were measured. For investigation of the structure of burrows, we carefully dug 10 burrows. The total length of burrows were 54.86 cm \pm 3 and all of them were V-shaped. The architecture of burrow is very unique to take rest, to rare young ones and also for self protection and predation.

Key words :- Spider, *Geolycosa* sp, Burrowing habit, Vairat, Melghat Tiger Reserve, India.

INTRODUCTION

Some burrowing wolf spiders (*Geolycosa*) are commonly mistaken for tarantulas. In this group the burrowing habits is developed. A number of researchers have shown that burrow density is not an important factor influencing the survival of *Geolycosa* spiders (Mc Queen 1883; Conley 1985). However, the importance of the positions of the burrow with respect to physical features of the habitat and thus possibly to critical resources, may be important. *Geolycosa* generally prefer well drained or sandy habitats (Wallace 1942; Mc Crone 1963). The spiders constructed burrows shortly after dispersing from their mother burrow and are brought to remain in the same burrow for life, enlarging it as they grow (Wallace 1942' Mc Queen 1983). The relationship between burrow depth and survival was first recognized by Humphreys (1973, 1978). The burrowing habitat play important role in the survival of *Geolycosa* spiders.

Study Area and Methods

Melghat tiger reserve (MTR) is located in the Satpuda hill ranges of central India's Maharashtra and annual rainfall between 950 to 1400 mm and average December, 2013, *Indian Journal of Arachnology*, 2(2).....34

mean temperature varies from 4⁰c (minimum) to 46⁰ c (maximum). Distribution of *Geolycosa* sp. is patchy. For the present work, study site was chosen at Vairat during summer season May - 2011. Vairat is located at 1178 m above MSL which is the highest point of Melghat Tiger Reserve (MTR) in Satpuda landscape.

During study period burrow diameters were measured in cm by using Vernier Caliper (PICD, ASI, COMP. INDIA) and depth was measured in cm by using rubber tube. The burrows were carefully dug to determine their structure and to collect spiders for identification. Rough sketch of burrow with major architectural features is shown in Fig. 7.

OBSERVATIONS AND DISCUSSION

Female *Geolycosa* sp. digs burrows and make a turret around the mouth of the burrow, sometimes only a narrow ring of dead grass, but often rising an half inch or more above the surface of the ground and covers it with straw, chips or any fine, loose material (Fig.6). They are sensitive to the slightest movement on the ground and take entry in their burrows. During night time we also we observed *Geolycosa* sp. removing the debris from the tunnel (Fig.2). Male spiders were observed with in a short distance of the opening of burrow. Their body color pattern exhibited camouflage for protection and their colouration is appropriate to the favoured habitat.

The spider sealed the entry door of their burrows with silk or debris during day time and their entrances were sealed by silk (Fig.5). However during night the burrows were not covered with silk (Fig.6) and spiders were seen at the opening of turret (Fig.3). It means that these spider are nocturnal in habit. The burrow entrance appeared to become blocked by the natural accumulation of sand and debris in *Geolycosa wrightii* (Gwynne and Wakiss, 1975). Main (1978) and Gray(1968) recorded door sealing behavior of trapdoor spider associated with seasonal weather conditions and predator avoidance. In Australian tarantula *Seleno cosmia stiringi*, deliberate plugging was observed frequently in summer (providing protection during molting and egg production) while natural weathering (Kotzman, 1990; Gabel, 1972).

Average burrow diameter of measured 50 burrows was recorded as 1.6 cm ± 0.2 . in the present investigation. Diameter of each newly discovered and previously marked burrow diameter was totally different. Burrow diameter has been studied by McQueen (1978, 1983), Miller and Miller (1984, 1991). A high correlation between spider size and burrow diameter has been demonstrated in some burrowing spiders



Figure: 1. *Geolycosa* sp.



Figure: 2. *Geolycosa* sp. removing debris from burrow or protected burrows by debris.



Figure: 3. *Geolycosa* sp. seating at opening burrow at night



Figure:4. Inner plaster of *Geolycosa* sp. burrow



Figure: 5. *Geolycosa* sp. - burrows block entrance by silk



Figure: 6. *Geolycosa* sp.- turret of burrow

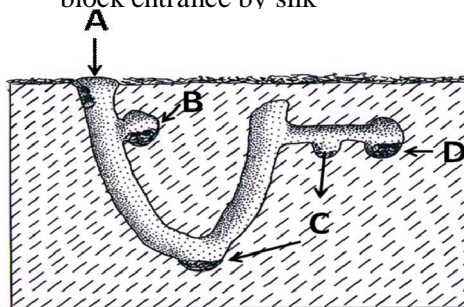


Fig. 7: Patterns of burrow-

- A- Turret
- B- First Nest
- C- Trap or Drainage
- D- Second Nest

(Decae *et al.*, 1982; Miller and Miller, 1984, 1991). Petrunkevitch (1911) also suggested that larger spiders occupy deeper burrows.

The relationship between burrow depth and survival was first recognized by Humphreys (1973,1978). To determine, the structure of burrows, we carefully dug 10 burrows. Inner side of burrow was plastered with some clay soil, sand, straw, dead leaf, body secretion and silk. The average total length of burrows was 54.86 cm \pm 3. The construction and design of burrow somewhat V-shaped (Fig. 7). At the entrance of each burrow silk nest was found which is probably used for hunting at night. At the angle of 360° of first nest the second nest is observed (Fig.7) which might be used for rest at the day time and also for . protection of eggs and development of spiderlings. The purpose of first nest immediately below the turret might be for waiting for the prey during predation.(Fig.7). The nest is also constructed out of soft leaves or grasses glued by secretion and silk. The drainages or prey trap like structures are present for protection in burrow. *Geolycosa* spiders make burrows in the soil during summer and these left over burrows after release of developed spiderlings help in water percolation after first rains (Vankhede 2011).

Thus, the burrow architecture of *Geolycosa* sp. Provide place for developing young ones and their similarity in this species indicates the genetic character for continuation of race.

REFERENCES

- Cambridge, O. P. 1876.** Catalogue of a collection of spiders made in Egypt, with descriptions of new species and characters of a new genus. *Proc. zool. Soc. Lond.*, 1876: 541-630.
- Conley, M. R. 1985.** Predation versus resource limitation in survival of adult burrowing wolf spiders (Araneae : Lycosidae) . *Oecologia* (Berlin), 67 :71-75 .
- Decae, A. E.; G . Caranhaac and G . Thomas. 1982.** The supposedly unique case of *Cryptocarenum cunicularium* (Oliver, 1811) (Araneae, Ctenizidae) . *Bull. British Arachnol . Soc.*, 5:410-419 .
- Gabel, J . R. 1972 .** Further observations of theraphosid, tarantula burrows . *Pan-Pacific Entomol.*, 48:72-73 .
- Gray, M . R . 1968.** Comparison of three “genera of trapdoor spiders (Ctenizidae, Aganippini) with respect to survival under aird,conditions . M.Sc . Thesis : University of Western Australia .
- Gwynne, D. and J . Watkiss. 1975 .** Burrow-blocking behaviour of *Geolycosa wrightii* (Araneae :Lycosidae). *Anim . Behav.*, 23 ;953-956 .
- Humphreys, W. F . 1973 .** The environment, biology and energetics of the wolf spider *Lycosa godeffroyi* (L. Koch 1865) . Ph .D . thesis, Australian National University, Canberra .

- Humphreys, W. F. 1978.** Thermal biology of *Geolycosa godeffroyi* and other burrow inhabiting Lycosidae (Araneae) in Australia. *Oecologia* (Berl.), 31 : 319-347 .
- Kotzman, M. 1990 .** Annual activity patterns of the Australian tarantula *Selenocosmia stirlingi* (Araneae, Theraphosidae) in an ari area. *J. Arachnol.*, 18 :123-130 .
- Main, B. Y. 1978 .** Biology of the aridladapted Australian trap-door spider *Anidiops villosus* (Rainbow) . *Bull. British Arachnol . Soc.*, 4:161-175 .
- McCrone, J. D. 1963.** Taxonomic status and evolutionary history of the *Geolycosa pikei* complex in the Southeasten United States (Araneae, Lycosidae). *Amer. Midland Natur.*, 70 :47-73 .
- McQueen, D. J. 1978.** Field studies of growth, reproduction, and mortality in the burrowing wolf spider *Geolycosa domifex* (Hancock) . *Can. J. Zool.* , 56 :2037-2049.
- McQueen, D. J. 1983.** Mortality patterns for a population of burrowing wolf spiders, *Geolycosa domifex* (Hancock), living in southern Ontario . *Can . J. Zool.* , 61 :2758-2767 .
- Miller, G. L . and P. R . Miller. 1984.** Correlations o f burrow characteristics and body size in burrowing wolf spiders (Araneae: Lycosidae) . *Ma. Entomol.*, 67 :314-317
- Miller, P. R . and G. L Miller. 1991 .** Dispersal and survivorship in a population of *Geolycosa turricola* (Araneae, Lycosidae). *Journal of Arachnology*, 19:49-54
- Montgomery, T. H., 1904.** Descriptions of North American Araneae of the families Lycosidae and Pisauridae. *Proc. Acad. nat. Sci. Philad.*56: 261-325.
- Petrunkévitch, A . 1911 .** Sense' of sight, courtship and mating in *Dugesiella hentzi* (Girard) a theraphosid spider from Texas . *Zool. Jahrb . Abt . Syst . Geogr. Oekol. Tiere*, 3 :355-375 .
- Reimoser, E. 1934.** Araneae aus SüdIndien. *Rev. Suisse Zool.*, 41: 465-511.
- Vankhede, G. N. 2011.** Conservation of spiders in India. ENVIS bulletin Arthropods and their conservation in India (Insects and Spiders), vol. 14, no. 1. 2011.
- Wallace, H . K . 1942.** A revision of the burrowing spiders of the genus *Geolycosa* (Araneae, Lycosidae). *Amer. Midland Natur.*, 27 :1-61 .